What is claimed is:

1. A titanium oxide film containing a dopant element formed on a silicon substrate by supplying a titanium compound for forming the titanium oxide film and a compound of a dopant element for a silicon semiconductor in a gaseous state to a surface of the silicon substrate heated to a predetermined temperature, wherein the concentration of the dopant element in the titanium oxide film becomes progressively higher from the surface of the titanium oxide film to the surface of the silicon substrate.

2. A titanium oxide film according to claim 1, wherein the predetermined temperature is 300 to 600°C.

3. A titanium oxide film according to claim 1, wherein the titanium compound is a titanium alkoxide and the compound of the dopant element is a phosphorus compound, a boron compound or an aluminum compound.

4. A titanium oxide film according to claim 1, wherein the titanium oxide film has a thickness of 65 to 80 nm.

5. A titanium oxide film formed by heating the titanium oxide film formed on the silicon substrate of claim 1 at a predetermined temperature to diffuse the dopant element in the silicon substrate so as to form a dopant element diffusion layer, wherein the dopant element diffused layer has a sheet resistance of 30 to 100 Ω/• and the heated titanium oxide film has a refractive index of 2.2 to 2.5 in a region where the dopant element concentration is low.

6. A production apparatus of a titanium oxide film comprising heating means for a silicon substrate and dispersion heads for

discharging independently a gaseous titanium compound for forming a titanium oxide film, a gaseous compound of a dopant element for a silicon semiconductor and an atmospheric gas, wherein a distance from bottom ends of discharge ports of the dispersion heads for the titanium compound and the atmospheric gas to a surface of the silicon substrate is greater than a distance from a bottom end of a discharge port of the dispersion head for the dopant element compound to the surface of the silicon substrate.

7. A production apparatus according to claim 6, wherein the difference between the distance from the bottom ends of the discharge ports for the titanium compound and the atmospheric gas to the surface of the silicon substrate and the distance from the bottom end of the discharge port for the dopant element compound to the surface of the silicon substrate is 0.1 to 30 mm.

8. A production apparatus according to claim 6, wherein a partition is provided between the dispersion heads and the silicon substrate, the partition being positioned at a circumference of the bottom ends of the dispersion ports for the titanium compound and the atmospheric gas, so that the gaseous titanium compound and the atmospheric gas discharged from the respective discharge ports are supplied to the surface of the substrate without dissipation.

9. A production apparatus according to claim 6, wherein conveyor means is provided to convey the silicon substrate heated to a predetermined temperature from a position immediately below the discharge port of the dispersion head for the gaseous dopant element, through a position immediately below the discharge port for the gaseous titanium compound, to a position immediately below the discharge port for the atmospheric gas.